Smart Classroom College English Listening Teaching System Based on Virtual Environment Technology

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ABSTRACT

This article mainly studies the design and realization of English listening teaching system based on virtual environment technology. This paper designs and builds a virtual experimental operating platform to assist students in experimental learning. At the same time, according to database design methods, steps, and database specifications, the database is designed, functional modules are divided, and the main interface of system operation is introduced in detail. The system adopts B/S architecture, interacts with the server through the browser, and the computing and processing functions are mainly completed by the server. This system uses black box testing to test and verify system functions. Complete the performance test of the system by checking the monitoring points in the performance test cases. Experimental data shows that more than 70% of students believe that they can learn and read English independently in the Cypris Club virtual language learning community.

KEYWORDS

English Listening, Interactive Function, System Design, Teaching System, Virtual Environment

1. INTRODUCTION

With the rapid development of communication technology and computer technology, especially with the wide promotion and application of Internet, the Internet has increasingly profoundly affected people's learning, work and lifestyle, and has become more and more integrated into all walks of life. In the industry, it has become an indispensable part of people's work, study and life. Virtual environment technology refers to the technology of using computer to generate a virtual world that can directly exert visual, auditory and tactile feelings on participants and allow them to observe and operate interactively. Virtual reality technology has the virtuality of surmounting reality. This is a new comprehensive information technology, which integrates many information technology branches such as digital image processing, multimedia technology and sensor technology, which greatly promotes the development of computer technology. English listening has a very important position in English teaching. The traditional listening teaching method is mainly to record listening materials into tapes and play them to students through tape recorders. With the continuous development of the second-generation website technology, the emergence of a number of new network application systems that serve the education cause has greatly improved the quality and efficiency of modern education, and has also further improved the experience of teacher-student interaction in the network environment. It

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also meets the requirements of modern education. With the development of information technology, various industries will inevitably merge with information technology to seek new development opportunities and enhance their own industry competitiveness. The education field is no exception. The emergence and use of the Internet, big data, cloud computing and various mobile terminals will surely set off a new wave of education reform. Under the mode of "selecting courses and taking classes", the number of English teaching hours is reduced, the frequency of meeting between teachers and students, students and students is reduced, and the time for students to study independently increases. How to improve the efficiency of English classroom teaching, ensure the intensity of students' listening and speaking training, guide students to carry out independent learning, make efficient use of self-study time, and help students to better individualize learning has become an urgent problem for frontline English teachers.

In order to make up for the inefficiency of traditional English classroom teaching, the teaching resources are single and scattered, the individualization of learning is difficult to achieve, the breadth and depth of student participation are insufficient, the time for classroom listening and speaking training is insufficient, and the students' evaluation and feedback are difficult. At present, domestic researches linking smart teaching systems with junior high school English listening and speaking classes are almost blank. Therefore, as a practical application of exploration, this research must be accompanied by many problems and deficiencies. This research also hopes to discover and summarize wisdom. In the system, several modules such as book resource module, training module, student personalized design module, evaluation and feedback module are set up for classified management. The teaching system assists the problems that may arise in the teaching of junior high school English listening and speaking classes, and proposes corresponding implementation strategies to provide practical experience for other frontline teachers to use tablet computers to assist the teaching of junior high school English listening and speaking classes, and provide a certain reference for subsequent research. With the continuous rapid development of social economy, the world today has also entered an era of rapid progress in information technology. The strong information technology is impacting the traditional education work, which has caused major changes in the current education work in terms of teaching methods and teaching composition. To do a good job in education modernization and improve the quality of teaching work, it is necessary to enhance the informatization of the teaching process, so as to make the development of education more and more advanced. Based on the detailed analysis of English listening teaching, this paper uses VR technology to construct a concrete virtual teaching system, which realizes the specific functions of the teaching system. Comprehensively consider the scientific curriculum system, collect factors such as students' listening preferences and curriculum styles, and use the improved collaborative filtering method to make personalized video recommendations for students. Smart classroom is the use of campus computer technology, network technology, communication technology and scientific and standardized management to integrate, comprehensive and comprehensively digitize all information resources related to learning, teaching, scientific research, management and life services in the classroom to form Unified user management, unified resource management and unified authority control. Express delivery means that students use mobile devices to connect to the campus network and the Internet through WIFI in the classroom to easily obtain learning resources. Teachers use multimedia teaching equipment to connect to the wireless network to view student learning, complete lesson preparation and conduct scientific research anytime and anywhere. The classroom use of its core wireless network realizes paperless teaching. Now the application of this teaching model is becoming wider and wider.

The development of virtual technology has greatly changed the traditional teaching methods. Kim M believes that previous studies on stability analysis of haptic simulation largely assumed that the virtual environment was passive. However, due to various reasons, including discretization errors and the dynamics of interaction between virtual tools and objects, the virtual environment may become non-passive. He analyzed the stability and performance of haptic simulation involving non-passive virtual environments. The dynamic interaction between virtual tools and objects is

modeled using a two-port network. He uses velocity and force mapping matrices for six degrees of freedom simulation analysis. The experimental results show that the stability of tactile simulation decreases when the virtual environment is not passive. His research is not accurate enough (Kim and Lee, 2019). Lutovac M M introduced the development of a reconfigurable virtual environment that can be used to program, control, simulate and monitor multiple robots, as well as applications in the education process. In the development process, pay special attention to the realization of modularity, scalability and openness, which represent the basic requirements of reconfigurability. He believes that the reconfigurability of the virtual laboratory can be considered from two aspects: as the possibility of reconfiguring the operating mode and as the possibility of reconfiguring the virtual robot and virtual laboratory. His research considers too few factors (Lutovac, et al., 2016). Menzies R J believes that although virtual reality (VR) devices have been developed for decades, it is difficult to measure the effectiveness of these devices in immersing the observer. He verified this measure by testing known differences between the equipment. He used a Wii balance board (covered by a foam pad) to measure the participant's ability to maintain a stable center of pressure. He compared the stability with eyes open and closed with the following: (1) iPod Touch worn using simple Google cardboard headsets; (2) Oculus Rift development with and without linear tracking Kit (DK) DK1, DK2 head movement. The experimental results show that the latter can better measure the immersion effect of subjects in VR equipment. His research lacks necessary experimental data (Menzies, et al., 2016). C. Hänel believes that in order to avoid problems with the simulator and improve its presence in an immersive virtual environment (IVE), a high frame rate and low latency are required. To evaluate this trade-off in IVE, he conducted a controlled user study of 53 participants. Searching and counting tasks are performed in cave with different volume rendering conditions, which are applied based on the viewer position update corresponding to head tracking. His research lacks a certain degree of innovation (Hänel, et al., 2016).

The smart teaching system is combined with the English listening and speaking class teaching in junior high school, the basic sentence patterns of oral English and listening recording are integrated into the micro-class, and more expansive learning resources are prepared for students, so that they have the necessary learning materials for meaning construction. Students watch the micro-class study in advance, which saves part of the teaching time. In the classroom, teachers have more time to create learning scenarios for students, allowing students to conduct independent summaries, group discussions and oral presentations. In this way, the teaching work of teachers is more retreated from the front stage to behind the scenes, and students become the main body of learning and the active constructors of meaning. Timely guide and comment to help and promote students to complete the construction of knowledge. This paper builds a system platform with the help of virtual environment technology, and adopts a system model that separates the front and back ends, so that it has good scalability and maintainability, and is more conducive to a large-flow, high-concurrency operating environment. Combining the current requirements of colleges and universities for English majors, it provides more practical and easy-to-operate measures and countermeasures for improving and perfecting the problems in teaching, so that teaching has a richer theoretical foundation and provides a guarantee for improving teaching quality. It also provides scientific basis and reference materials for the construction of related disciplines, and effectively promotes the overall improvement and further development of students' English ability.

2. TEACHING SYSTEM DESIGN IN VIRTUAL ENVIRONMENT

2.1 Virtual Environment Technology

In the traditional computer graphics, the scene is usually described as the basic geometric elements. Then the attributes and distribution of light sources, the reflection properties of object surface to light and the lighting model needed for rendering are defined. Finally, the realistic scene image is generated by ray tracing, radiance and other rendering algorithms. There are two main problems in this

method: first, the rendering process of complex scenes involves a large number of complex lighting calculations, so it is difficult to meet the requirements of real-time rendering and user interaction; second, the artificially specified light source properties and reflection attributes of the model surface have experimental quality, so it is difficult to guarantee the authenticity of the drawn image (Bertella, et al., 2016) (Martoncik and Loksa, 2016).

At present, virtual environment can be divided into two research directions: the study of the relationship between a single person and the virtual world; the study of the relationship between a group of people and the virtual world. For these two directions, the relationship between the group and the virtual world is composed of a variety of complex relationships between individuals and the virtual world, so the relationship between individuals and the virtual world has a small scope and low requirements, and the relationship between the group and the virtual world is the opposite. Correspondingly, there are two kinds of virtual environment system, the former is single machine system, the latter is distributed system. For each user, it is still a stand-alone virtual environment system, hereinafter referred to as the customer environment. For the whole distributed virtual environment system, it is a system combination of multiple client environments connected by virtual world server (Luthfi and Prayudi, 2017). Therefore, the role of virtual world server is to make us no longer limited by physical boundaries. It can connect multiple customer environments (luthfi and prayudi, 2017), and it can maintain the consistency of virtual world data of each user. This consistency does not mean that the virtual world data on the virtual world server and the single computer system that each user faces are identical, but that all users are facing the same virtual world, just as people in real life live on the same earth but in different corners. Thus, multiple users can share the virtual space (Jakubiec, 2016).

In independent activities, interactions, or interactions with users, the dynamics of virtual objects must have certain performances. These performances should obey the laws of nature or the laws imagined by the designer. For example, when being pushed by force, the object will move upward, tip over, or fall from the table to the ground. Autonomy refers to the degree to which objects in the virtual environment act according to the laws of physics (Surendra and Peace, 2017). The "immersion", "interactivity" and "conception" of virtual reality technology enable participants to be immersed in the virtual environment, surpass it, enter and exit freely, and interact freely. It emphasizes the leading role of people in the virtual reality system, that is, people's feelings are the most important in the entire system. Therefore, the two characteristics of "immersion" and "interactivity" can be said to be the essential difference between virtual reality technology and any other related technologies. The key of the photometric stereo method is the brightness equation of each point in the image, that is, the irradiation equation (Wang, et al., 2016). Its expression is as follows:

$$I(x,y) = k_d(,y)S \bullet N(x,y) \tag{1}$$

Where I is the brightness of the surface point, S is the light source vector, N is the surface normal vector, and k_d is the surface reflection coefficient.

Convex hull texture mapping maps the bumpy texture to the surface of the object. Different from the previous texture mapping method, it produces the uneven visual effect by perturbing the surface normal vector. The value of texture is not the R, G, B value that represents the color, but the value used to represent the degree of protrusion (Hofs, et al., 2017). If F(u,v) is used to represent the texture function, and the smooth surface parameter function before mapping is P(u,v), the mapping is to do the following operations at (u,v) on the surface of the object to get the new surface position:

$$P'(u,v) = P(u,v) + F(u,v)N(u,v) \tag{2}$$

In the formula, $N(u, v)$ is the normal vector of the surface. Virtual teaching is a new teaching mode that combines traditional teaching and information technology on the basis of modern talent training. It is a form that humans need to enter the virtual space for education and teaching activities. Virtual reality technology can create a variety of realistic learning environments, provide learners with rich sensory stimulation and natural interaction methods, thereby bringing an immersive learning experience (Stavness, et al., 2016).

2.2 English Listening Teaching

In recent years, English linguists have translated a large number of works related to cognitive linguistics in Europe and America into English. It is generally believed that analyzing language features from the perspective of cognition can not only enhance the interest of language learning, but also improve the efficiency of language acquisition. The framework theory of cognitive linguistics is an important linguistic theory summed up in the process of human language development, and plays an important role in language communication activities in daily life (Ni, et al., 2016) (Cavanaugh, et al., 2016). Listening teaching is a very important part of the English subject. It not only directly affects the effect of English teaching, but also has a very important influence and effect on the training of students' professional knowledge and professional language skills. In order to carry out English major listening teaching smoothly, and at the same time to ensure the rationality and scientificity of listening teaching design, we must realize the importance of the application of vr and smart classroom teaching mode. This article analyzes this, and gives full play to the role of smart classroom and virtual reality technology in the design of listening teaching for English majors, so as to improve the students' English listening ability.

There are two levels in listening comprehension: the first level is the understanding of sentence meaning, which is to recognize the relationship between the received signal and pronunciation and grammar, so as to understand the meaning of the sentence; the second level is the understanding of the sentence in the communicative function, that is, the listener not only receives the literal meaning of the listening material, but also infers the implied meaning of the utterance. Listening comprehension is a process in which the human brain consciously and actively processes the language it hears (Musharraf, et al., 2016). In this process, the listener takes various methods to achieve the purpose of understanding according to the clues provided by the information in a certain situation and the social, cultural and linguistic knowledge that he has mastered. It should be said that the understanding of the essence of listening comprehension has gone through a long process. Today, the importance of listening in foreign language teaching is increasingly recognized. It can be seen that the importance of listening teaching is determined by the needs of social development (Shin, 2018).

In the field of university education, English Teaching in China is mainly divided into two aspects: non professional college English teaching and English professional teaching. The number of students receiving English Teaching in non professional universities is the absolute majority, while the number of students receiving English professional teaching is relatively small. Frame theory is a practical theory, which can be widely used in various daily English teaching activities. Therefore, in English listening class, it is necessary for teachers to explain and supplement some linguistic theoretical knowledge to students, and should explain the basic theoretical knowledge of framework to students (Parmar, et al., 2016) (Sinnott, et al., 2016). Because the recording materials in English listening class are basically about one or several topics, it is very important for teachers to introduce the theory in class. In all aspects of teaching, listening teaching is the most special part. Different from the relatively unified form of characters, language is not unified. Even in a country or a region, there are many kinds of language forms. For example, there are two kinds of English, American English and British English, with some differences in pronunciation. This leads to language learners' difficulties in the process of listening (Akter and Nweke, 2016).

2.3 System Design

The teaching system based on virtual technology digitizes the resources of the real campus and forms a digital space, which makes the real campus extend in time and space. It is based on the network, using digital means to manage the campus environment (including equipment, classrooms, etc.), resources (such as books, handouts, courseware, etc.), activities (including teaching, learning, management, service, office, etc.). In the campus, it is convenient to realize the whole process of teaching, scientific research, management and service of the school through modern means, so as to improve the teaching quality, scientific research level and management level of the school (Kohan, et al., 2017).

The system is mainly composed of six functional sub modules: virtual design, virtual assembly planning, virtual assembly process simulation, virtual environment, virtual assembly instructions, stereo display, etc. As shown in Figure 1. The whole system is based on the unified assembly parts model and assembly information model. On this basis, the assembly information base and assembly part library are established to support the design, analysis and processing of design and assembly information in the whole system operation cycle. The teaching subsystem of intelligent teaching system mainly realizes intelligent recommendation of learning content and intelligent selection of teaching strategies in intelligent teaching system, including teaching management module and BDI module (Wier, et al., 2017). The teaching management module is mainly used to realize learners' independent learning or complete the learning tasks under the guidance of teachers. It is mainly divided into learning agent, learning problem agent and teacher agent. Learning agent is the performance of learners' participation in the system, which realizes the interaction between learners and the system through external devices (mouse, keyboard, etc.); the learning problem agent is mainly responsible for dividing the learning content according to its difficulty degree to realize the knowledge learning from easy to difficult and from low level to high level; the teacher agent needs to infer the learning ability of the learning agent according to the records of the learning agent. BDI is mainly used to model the behavior of teachers' agent in this system to realize the intelligent selection of learning content in intelligent teaching system (Ware and Young, 2016) (Montgomerie, et al., 2016), under the comprehensive analysis of the general server, the subsystems at all levels are processed. In addition, because the learning and teaching process in the virtual intelligent teaching system needs to be carried out in 3D virtual scene, the load of the whole system is heavier. In order to improve the interaction efficiency and scalability of the system, the interface module is designed to make the system architecture more clear and achieve the purpose of improving cohesion and reducing coupling (Qadri, et al., 2016).

Figure 1. Functional sub modules of the system
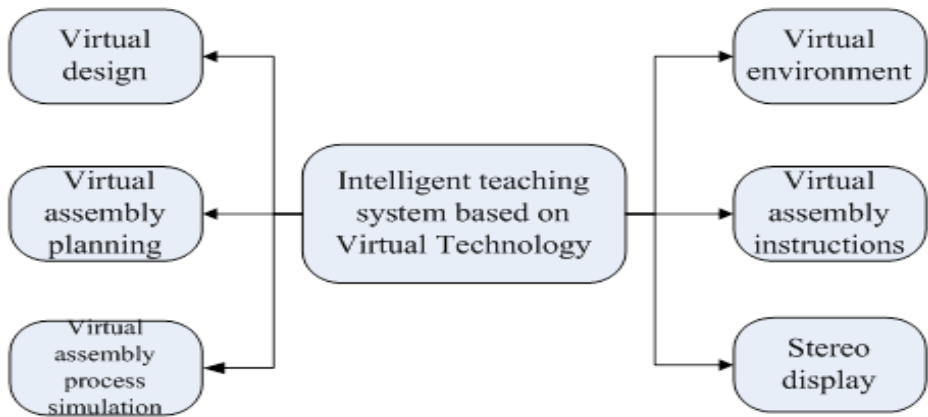
The English listening teaching system based on virtual environment technology is mainly oriented to three types of users: student users, teacher users and administrator users. In the design process of listening teaching for English majors, if you want to ensure that the design effect can be effectively improved, you must be aware of the importance of the flipped classroom teaching concept. Especially when the teaching principles are determined, usually the original teacher-based SPOC model is directly transformed into a SPOC model that meets the actual requirements. SPOC is a small-scale restricted online course. SPOC perfectly adapts to the exclusiveness of elite universities and the values of pursuing high achievements; The low cost redefines the role of teachers and innovates the teaching model. In the process of formulation and specific application of the SPOC model, it mainly regards students as the teaching center of the classroom. However, teachers can still supervise students' learning at all stages and see the progress of students' learning. The only basic condition to be followed in the development of teaching content in any link is to understand. Throughout the development of smart classrooms, teachers should combine the actual situation to create a learning space with flexibility for students, and at the same time meet the basic requirements of students in the daily learning process.

(1) Students: have the authority related to the class. Specifically, it includes inputting student information, reading teacher profiles and course profiles, obtaining system announcements, selecting courses, participating in online teaching, submitting homework, participating in course tests, checking examination results, participating in Q & A, and evaluating teachers and course contents. System feedback (Shubita and Issa, 2019).
(2) Teacher: responsible for the authority and resources required by the teacher. Specifically, it includes inputting teacher's information, online teaching, uploading and modifying courseware, launching examination and performance evaluation. System feedback.
(3) System administrator: Be responsible for the management and maintenance of the teaching system and deal with the real-time feedback from users in time. Specifically, it includes the management of teachers and student users, online course resource management, etc (Bridge, et al., 2017).

Database design is to establish the most suitable mode, construct the appropriate database and application system in a specific use environment, so as to store data and meet the needs of all aspects. Database design is the technology of establishing database and its application system. It is the core technology in the development and construction of information system. Due to the complexity of database application system, database design becomes extremely complex. Therefore, the best design needs to carefully plan and structure the data objects in the database and the relationship between these data objects. The design of database mainly includes three steps: requirement analysis and structure design.

(1) Demand analysis. In the process of database design, we must first analyze the requirements. Demand analysis can be realized through investigation, inquiry and research. Through the means of investigation and inquiry, we can analyze the needs of users, that is to determine the final data we need.
(2) Conceptual design. The second is to establish a conceptual model. Conceptual model is a comprehensive and abstract expression of user survey, which can be represented by E-R diagram.
(3) Establish the data model. The conceptual structure is transformed into a relational model and optimized (Pourashraf, et al., 2017).

3. ENGLISH LISTENING TEACHING SYSTEM TEST

3.1 Test Environment

Functional testing is mainly requirements verification, the purpose is to ensure that the final system implementation is consistent with the initial requirements analysis, whether it can meet the needs of users, and whether the requirements are implemented correctly. Performance testing is done through stress testing, and the purpose is to verify whether the performance of the system can meet the requirements of multiple users accessing the system at the same time. The test of the system is mainly aimed at the client, which is tested through computers and mobile devices (Robert and Levin, 2018). The system test environment is shown in Table 1.

Table 1. Test environment

Required hardware	Model
Processor	Inter(R)Core(TM)i7-4700HQ CPU@2.30GHz
RAM	16G
PC operating system	Windows 10
Browser	Chrome 71

3.2 System Architecture

The system adopts B / S architecture, and interacts with the server through the browser. The computing and processing functions are mainly completed by the server. The three-tier architecture technology consists of presentation layer, business logic layer and data access layer. The platform layer of virtual environment is composed of virtual world manager and virtual world generator. Scene manager and virtual state machine are designed as two independent modules physically, which can be used alone or in combination. Logically, they are the relationship between controller and server, and virtual world manager is responsible for the life and death of virtual world generator. It is responsible for controlling the start, stop, recovery and end of the virtual world generation thread (Qin, et al., 2018). The architecture design of this system is shown in Figure 2.

Figure 2. System architecture
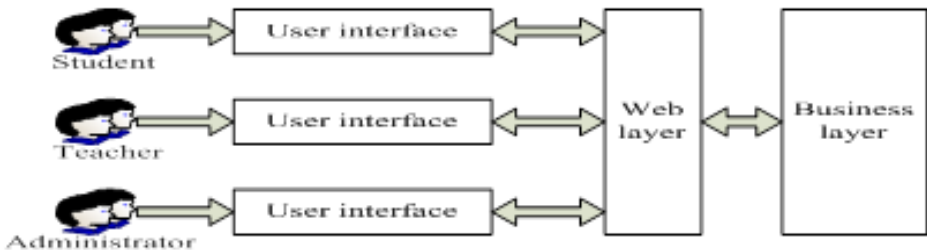
3.3 Test Process

The system uses black box test to test and verify the system function. This system uses the black box test method, hoping to find problems as far as possible, including: whether the system interface is wrong; verifying whether the system functions are correct and whether the functions have been fully realized; whether the response data of the user's access data domain system is wrong; whether the system initialization, termination and performance are wrong, etc (Prendinger, et al., 2017).

(1) Login function test

Enter the correct user name, password and verification code information on the login page of the English listening teaching system. Click the "Login" button to check whether you can enter the system homepage correctly. Check whether the system enters different interfaces through the user's operating authority, system administrator users enter the system administrator page, and ordinary users enter the ordinary interface.

(2) Add function test

Pass the account and authority verification on the login page of the system, and successfully enter the system. Go to the home page of the user management function and click the "Add User Information" link to enter the page for adding user information. Enter correct and complete user information, and click the "Submit" button to add user information. The new user information is successfully added, and the added record is consistent with the record of the user table in the background database.

(3) Performance test

Performance indicators mainly include response time, throughput, and so on. Complete the performance test of the system by checking the monitoring points in the performance test cases. To confirm whether the basic performance requirements of the system are met, performance testing is very important. In this teaching system, the response time and throughput of the system are mainly tested. In the system performance test cases, the use cases are divided according to the number of online users, and the response time of the client is tested in each use case. If the indicator requirements are met, the use case is deemed qualified, otherwise it is unqualified, and the system defects are recorded according to the actual test structure.

4. SYSTEM TEST RESULTS

4.1 Comparative Analysis of Virtual Environment and Real Teaching

Immersion is the most important feature of virtual reality technology. Users feel that they are part of the virtual world, and have initiative to participate in various activities in the environment created by virtual reality technology. The immersion feeling produced by virtual reality technology mainly comes from the user's sense of smell, vision, hearing, touch, movement and body perception. When the user feels the multi-directional stimulation of the virtual world, it causes the user's ideological resonance and forms psychological immersion, so as to feel into a real world. The comparison results of virtual environment and reality teaching are shown in Table 2. It can be seen from the data in Table 2 that students and teachers in the test generally have a high evaluation on the system functions, especially the ability to select instructors and learning units independently, and to add or delete the three functions of learning units. More than 70% of the students gave the highest evaluation, no one is dissatisfied with the projects. It shows that educators and learners have given positive recognition

to the system. The related functions of the system meet the personalized needs of learners in learning, and bring convenience for their learning. From the satisfaction survey and feedback from educators and learners, both sides of the teaching system are basically satisfied with the learning of personalized teaching process. From the perspective of students' achievements, the system is effective in improving learners' learning efficiency. The results show that the virtual learning environment developed by this research is effective in stimulating learners' learning interest, enhancing learning initiative, supporting educators and learners to carry out personalized teaching and learning, and improving teaching efficiency. The system has achieved the predetermined development goal, the development process of the system is scientific, and the developed system is successful.

**Table 2. Comparison results of virtual environment and real teaching**

Satisfaction Project	Very satisfied	Satisfied	General	Not satisfied	Very dissatisfied
Choose a course	67.2	32.8	0	0	0
Determine the instructor	72.4	27.6	0	0	0
Select learning unit	53.4	25	3	0	0
Determine the order of learning	60.3	44.8	0	0	0
Determine the learning unit	67.2	3.1	3	0	0
Execution condition	77.6	9.7	5	0	0
Unit of study	67.2	28	6	0	0
Lock/unlock	72.4	2.4	2	0	0

4.2 System Function Analysis

As a student, before starting the experiment, they must preview, understand the purpose, requirements, process and precautions of the experiment, so the preview module is set up. In the experimental system, preview materials related to virtual experiments are provided for students to use, and students can access them through preview module. The experimental module is the most important functional module of the whole system. It is composed of three sub modules: virtual experiment, virtual experiment effect test and experiment report submission. Students enter the virtual experimental environment to do experiments online. After the experiment, they can write and submit the experimental report in the experimental report submission module, and can also know whether the completion of the virtual experiment has achieved the established purpose in the experiment effect test. Students may encounter a variety of problems that can not be solved independently in the process of experiment. They can discuss and ask questions through the course forum module. The results of system function analysis are shown in Figure 3. The score after the test was taken as the dependent variable and the group as the independent variable for independent sample t-test. Statistical analysis showed that the test results of the experimental group were significantly higher than those of the control group. There were significant differences among the groups ($P < 0.01$). This shows that the academic performance of the experimental group is significantly better than that of the control group. In other words, the experimental group using virtual environment in English listening can effectively improve their English learning performance. The virtual experiment teaching system can help administrators to complete the management task. Experiment is the core of the system, which is composed of teaching material subsystem and virtual experiment subsystem. Experimental teaching material subsystem is the support of virtual experiment subsystem. After entering the experimental system, students must

first be familiar with the purpose, requirements and principles of the experiment, and carefully check the experimental guidance before they can enter the virtual experiment subsystem. Before the online experiment, students also need to preview the experimental knowledge and master the instruments and equipment used in the experiment, so as to make full preparation for the better completion of the virtual experiment. VR plus the smart classroom teaching model and its rational use in the design of English majors' listening teaching can not only improve students' enthusiasm and initiative, but also provide effective guarantee for students' learning level improvement and provide virtual reality. The efficiency and effectiveness of technology in smart classroom applications lay a good foundation.

Figure 3. System function analysis results
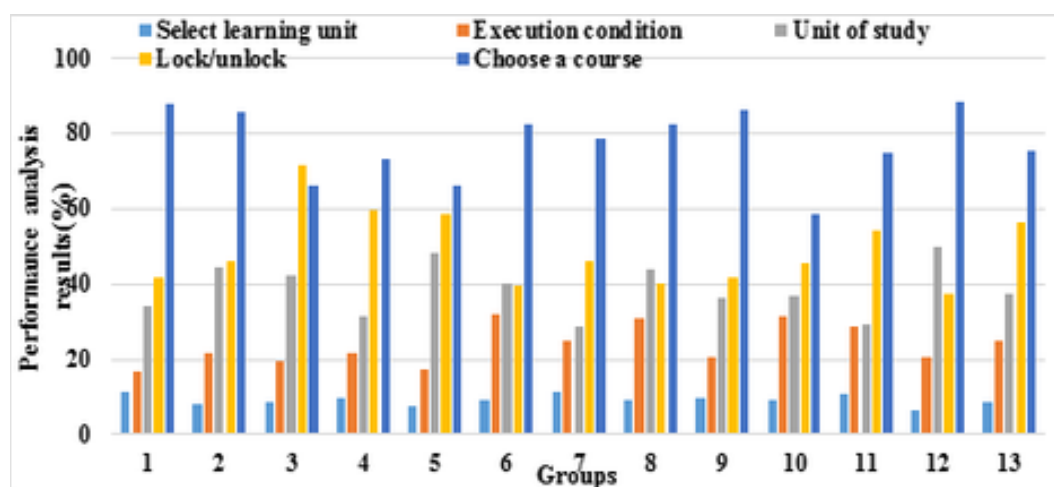
4.3 Changes in the Learning Styles of Teachers and Students

The virtual experimental teaching system focuses on the operation of multimedia system equipment. Students can master the functions of multimedia system equipment through the understanding of the equipment and the practice and observation of function keys in the process of virtual experiment. They can also have a certain degree of understanding and understanding of the experimental phenomena produced in the operation of multimedia equipment. Taking virtual experiment as a supplement to the actual experiment teaching, students' practice time will be greatly shortened, and the experimental effect will be more significant. Peer to peer learning, cooperative learning, encounter difficulties, can independently ask foreign friends for help. Students need teachers to provide guidance for them in the virtual language learning community, how to choose topics for discussion, and how to improve English level and communication skills from teachers in the process of learning. For example, a teacher in a virtual language community may ask a student to express an opinion on a certain topic. If the student's topic deviates, the teacher is required to help him return to the original track.

The analysis results of the change of teachers' and students' learning styles are shown in Figure 4. From the above test results, it can be seen that after the introduction of the framework theory, the accuracy rate of the first group of students is 90% and the lowest is 10%. Although the individual deviation is still large, the average accuracy of the first group of students is relatively higher than that of the second group of students who have not introduced the framework theory. And the average accuracy of the three test results also showed an upward trend. Maybe some students are too narrow to talk about a certain topic. At this time, the teacher will provide some help to expand the students'

thinking. When a student is not able to express clearly, the teacher will help him to express the meaning clearly. In addition, the teacher can adjust the participation in the class so that each student has the opportunity to express his / her own opinions. This is a good exercise for students who are not active. With the help of teachers, students will make progress through such course learning activities. In a questionnaire survey, it is found that environment is a major factor affecting students' English learning. 71.4% of the students think that the existing teaching environment only occasionally enables them to have sufficient learning motivation and positive learning attitude, and only 28.6% of the students think that they can have a positive learning attitude in most cases. In addition, 93% of the students are eager to have the opportunity to communicate with foreigners and learn foreign languages in the real language environment. 7% of the students occasionally have this expectation, and no students do not want to participate in it. It can be seen that the real environment can not mobilize students' strong interest in English learning. Compared with this, students are more eager to communicate with foreigners in the real language environment to learn English.

Figure 4. Results of analysis of changes in learning styles of teachers and students
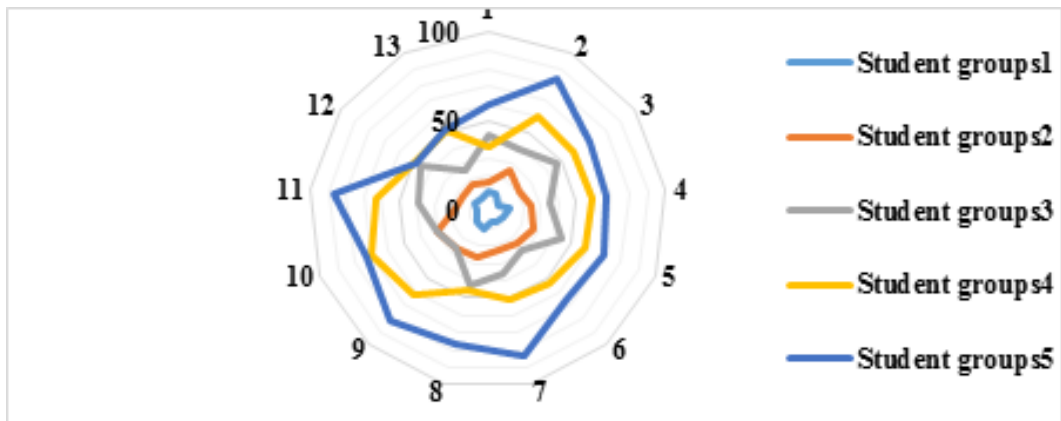

4.4 Students' Learning Motivation

The analysis results of students' learning motivation are shown in Figure 5. As can be seen from the figure, more than 70% of the students think that they can learn and read English independently in the cypris Club virtual language learning community. First of all, it's not a real classroom. People are thousands of kilometers away from each other. They are just face-to-face between their heads. Students do not have to worry about what mistakes they will make, and there will be no tense atmosphere and embarrassed expression, which will reduce the burden of students psychologically. Secondly, students choose the course according to their own interests. They can prepare in advance by observing the timetable. There is a certain degree of tension at the beginning of the conversation, but under normal circumstances, the excitement of communication will replace tension in the process. Students are eager to express their views in this virtual environment, and they are eager for teachers to comment on their statements or communicate with each other, so as to make progress.

Generally speaking, the students are enthusiastic about participating in this autonomous learning activity. One of the reasons is that they can freely choose their favorite courses, plan their study time independently and arrange their study schedule, so that students can give full play to their learning autonomy. Secondly, these courses are taught by native English teachers. In addition to their own students, there will also be students from different countries to participate in them. This open learning

environment fills students with a sense of novelty. Contact with native English teachers and students stimulates their enthusiasm for learning. Some courses are about proverbs. Students who are interested in this topic can be prepared to participate in the study and discussion of this course in advance. Here, in addition to the introduction of learning methods, the most important is the discussion between students. When you click on each course, a detailed introduction to the course will appear. As a result, students will gradually get used to this learning method. Only in this way can they learn something, and students will be more self-conscious. In the process, they will constantly improve their sense of responsibility and urge themselves to learn English autonomously according to the requirements of teachers in the virtual environment.

**Figure 5. Analysis results of students' learning motivation**
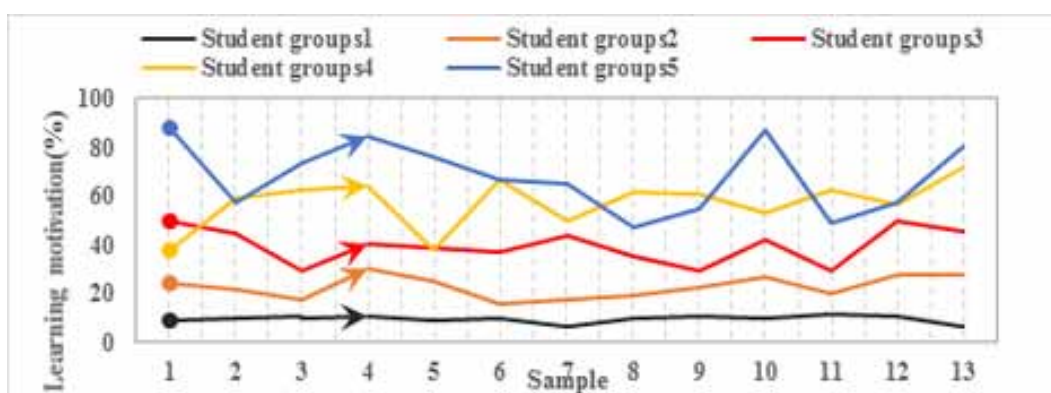
4.5 English Communicative Competence

The analysis results of English communicative competence are shown in Figure 6. Virtual environment technology is helpful to improve students' English communicative competence. Students can freely choose the location of oral communication in virtual environment. Of course, the oral communication in cypris club has also achieved good results, which has become an unforgettable experience for students. They can communicate with their native speakers through microphone. The peers in this virtual language learning community are very friendly and follow the rules of the community. Friends talk about a wide range of topics, from tourism to culture, diet, study, work, entertainment and so on. By adding friends, you can get information about whether your friends are online at any time. Your peers will also provide more help according to your requirements. For example, you are eager to chat with pure English native speakers and make new friends with the help of your peers, and realize your own online communication very quickly. This makes oral communication with real people very easy, students will be very happy to learn English, subtle progress.

The students who participated in the experiment are very willing to communicate with their native English friends because they can learn English in a pure environment, which is very rare for most students learning English in Chinese environment. When students learn English in such an environment, they can fully immerse themselves in the English environment, because when people talk, when typing chat, when reading information instructions, they are all in English. In such a virtual learning community, people are immersed in the target language environment. Everyone sat together face to face, sharing common interests and various topics. Here has become a place for students to carry out oral communication and a place for students to study and live. In addition, in the process of communicating with people, the students' English has also made progress, and the English they

have learned is the latest and most commonly used English in life. At the same time, through the comparison with the previous listening level test using traditional learning methods, it is found that the students' performance has been greatly improved.

Figure 6. Results of the analysis of English communicative competence
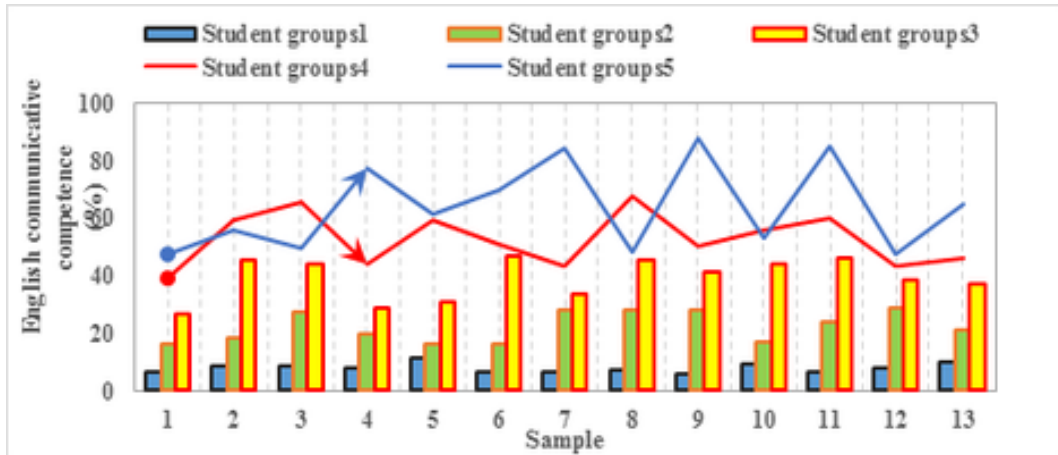
5. CONCLUSION

This article mainly studies the design and realization of English listening teaching system based on virtual environment technology. From the experimental results, the application of the framework theory to the teaching of English listening, on the one hand, the teacher can have a more comprehensive understanding of the cognitive models of different students, so that they can be more targeted to guide students to modify or supplement and improve their existing cognition. The model can also be more targeted to supplement background knowledge and help students improve their correct understanding of a certain framework. On the other hand, under the guidance of teachers, students can make appropriate amendments or supplements to the framework that has been formed, and accumulate necessary cognitive materials for improving English listening ability. The virtual environment technology combines computer-supported collaborative work technology, virtual reality technology, artificial intelligence technology, multimedia technology, and network technology, which greatly enriches the functions and applications of computers as interactive and communication tools. It is the current research in the computer field. Development and application hotspots. At present, virtual environment technology has been applied in many fields such as military simulation, entertainment, education, and medical care. However, due to the complexity of the virtual environment technology system itself and the limitations of existing supporting technologies, a scalable virtual environment technology is constructed. The system is still a challenging subject. This paper studies the key technologies of scalable virtual environment technology, starting from the three aspects of virtual environment technology architecture, interest management and multicast communication, and proposes corresponding solutions, aiming to build a scalable virtual environment technology system provides technical support.

The overall goal of the system implementation design is to build a more effective learning platform for students with the help of online video and online teacher-student interaction technology. The realization of the online experiment function can ensure that system users can use the server-side

reserved compilation interface to complete the required diversified teaching content display related operations without installing the compiler program; the virtual scene realized in the online experiment The construction is a major innovation to the traditional teaching method, and the virtual teaching system obtained from it brings more real visual experience to users. The system uses virtual reality technology to realize the construction of virtual classrooms and virtual laboratories. Compared with the traditional online teaching system in terms of expression, it has been greatly improved, making the virtual teaching system give users a more realistic visual experience. The virtual environment can be described from multiple levels and different perspectives. From a technical perspective, the use of three-dimensional graphics rendering and display, information exchange, human-computer interaction, network communication and other technologies to build a real-time and true reproduction of user motion, perception and environmental sound effects from a functional perspective, the computer digital space with other effects aims to provide a virtual space with real-time remote meeting, meeting, operation, and remote design functions for many geographically dispersed users. From the perspective of network operation, one system contains a set of independent user processes and a set of autonomous simulation simulation processes, and each process realizes inter-process communication through the network to complete tasks together. From the perspective of computer science, it integrates network systems, collaborative systems, and distributed systems. For the whole distributed virtual environment system, it is a system combination of multiple client environments connected by virtual world servers, which realizes the coordination on the network.

Virtual environment technology has created a new research field for the development of human-computer interaction interface. At the same time, it provides a new interface tool for the application of intelligent engineering. It also provides a visual means for large-scale data of various projects. Using virtual terminals instead of traditional PCs as student terminals in network classrooms has completed the goal of information construction in the higher education industry, and can easily complete system access with lower cost and less deployment time. The teacher computers and student computers in the network classrooms of colleges and universities are relatively concentrated. They are directly connected through one or more switches, and the computer network classroom can be deployed in the cloud terminal mode. Using virtual reality technology to assist teaching can effectively increase the density of practice and shorten the learning cycle. Students can consciously spend more time practicing, understanding and mastering technical skills, and improve students' understanding, self-confidence and interest, and reduce teachers' labor strength. The design and implementation of the English listening teaching system based on virtual environment technology has greatly improved students' interest in English listening teaching in English listening teaching, which has helped them to invest in English listening. However, the article is in there are still some technical problems in virtual reality technology. This technology is still relatively shallow, so we still need to further strengthen the research. In the subsequent research, I believe that this teaching system is of great help to students' teaching. Junior high school English listening and speaking teaching based on the smart teaching system, through the use of micro-classes and electronic teaching resources provided by other teachers, to provide students with sufficient learning time and learning content, and create various conditions conducive to student learning. Teachers can also monitor and feedback students' learning situation in time through the network and background data, and provide individualized assistance to students when they have learning difficulties. If the student's learning ability is slow, he can watch the micro-class teaching video repeatedly until he understands it. In this way, the model adopted in the classroom is collective teaching, supplemented by appropriate individualized teaching before and after class. This is in full compliance with the viewpoint advocated by the mastery of learning theory.

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